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ABSTRACT

Researchers have long been interested in why some children have behavioral and developmental problems while others appear to develop "normally." A substantial body of research supports the notion that a child's early experiences--from birth to school entry--can influence significantly later cognitive, behavioral, educational, and economic outcomes. This review of the literature focuses on factors that affect children during their first 5 years of life. The review begins by examining the literature that identifies associations between children's outcomes and their early family and neighborhood experiences. This literature forms the basis for past efforts to initiate early childhood intervention programs (such as home visiting, childcare, and preschool). Next, the review examines recent discussions of research into brain development, especially as it relates to cognitive and behavioral development before age 5. These findings provide support for early childhood intervention programs. The third section of the review examines evaluations of early childhood intervention strategies for families with infants and young children; the fourth section reviews early childhood programs operated by federal and state governments in California. The final section identifies a number of policy issues and options the legislature may wish to consider when debating early childhood intervention proposals. Appendices present trends in child indicators, basic structure of the brain at the cellular level, and experimental research on cognitive development. Contains about 140 references. (EV)

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BIRTH TO KINDERGARTEN: THE IMPORTANCE OF THE EARLY YEARS

A Comprehensive Review of the Literature and a Series of Policy Options for Early Childhood Interventions in Response to a Request by Senator Dede Alpert

By

David C. Illig, Ph.D.

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INTRODUCTION

Recent news stories about advances in our understanding of brain development during the early years of life have stimulated interest in early childhood intervention programs.[1] In addition, accounts of domestic violence and child maltreatment, and concerns about the potential effects of welfare reform on children have stimulated interest in programs to mitigate the effects of such factors on children as they grow into adulthood.[2] Interest in early childhood interventions also is stimulated by reports suggesting that families' ability to provide effective support for children has diminished.[3] Reasons include an increase in the number of single parent families, an increase in income inequality (particularly for parents with little education), and an increase in the proportion of children living in poverty – see Appendix A for detail. These conditions are exacerbated further by the dual perception that the educational system is failing, and that children are entering school unprepared.

This report focuses on factors that affect children during their first five years of life. A substantial body of research supports the notion that a child's early experiences – from birth to school entry -- can influence significantly later cognitive, behavioral, educational, and economic outcomes. A key finding in this literature is that children growing up in more stressful environments are more likely to experience delays in cognitive[4] and behavioral development. Stressful environments include dysfunctional homes, violent neighborhoods and homes, families living in poverty, parents who abuse drugs or alcohol, and parents who suffer from mental disorders. Such delays, in turn, can affect long term outcomes for children including school completion, employment, teen pregnancy and childbearing, substance abuse, and criminal behavior.

This paper begins by examining the literature that identifies associations between children's outcomes and their early family and neighborhood experiences. This literature forms the basis for past efforts to initiate early childhood intervention programs (such as home visiting, childcare, and preschool). Next, the paper examines recent discussions of research into brain development, especially as it relates to cognitive and behavioral development before age five. These findings provide support for early childhood intervention programs. The third section examines evaluations of early childhood intervention strategies for families with infants and young children; while the fourth reviews early childhood programs operated by the federal and state governments in California. The final section identifies a number of policy issues and options the legislature may wish to consider when debating early childhood intervention proposals.

THE EFFECT OF "FAMILY RISK FACTORS[5]" ON CHILDREN

Researchers have long been interested in why some children have behavioral and developmental problems while others appear to develop "normally." Such problems can affect children's performance both in school and later in life – often called lifecourse outcomes. This section examines two issues related to outcomes for children and families. It begins by examining the literature regarding relationships between economic, home and community factors experienced by young children and their lifecourse outcomes. Next, it discusses how multiple family risk factors and so-called protective factors increase or decrease the likelihood of cognitive and behavioral delay for children who are subject to such factors.

Children's Early Environment Influences Later Outcomes

Over the past thirty years, numerous studies have identified associations[6] between a family's economic, educational, social, emotional, and parenting resources and practices; and increased likelihood of cognitive delay,[7] behavioral problems, and undesirable[8] lifecourse outcomes for children. Lifecourse outcomes as used here describe a set of health, social adjustment, criminal behavior, substance abuse, educational attainment (often measured by school completion), and employment outcomes that occur during a child's path into adulthood. A complete understanding of the relationships between underlying family structure, socioeconomic characteristics, and income-based influences on child outcomes is not yet available because the processes by which early influences affect later behavior are complex. Recent studies, however, are beginning to unravel how family risk factors experienced by young children may affect her/his development into adulthood.[9]

The following discussion describes some of the associations between children's early experience and their later cognitive and behavioral development. It also points out some of the interrelations among those factors that affect children during their early years. A more explicit understanding of this literature may help develop an understanding of the complexity of influences on children and the effects of those influences on their outcomes.

Poverty.[10] Family poverty experienced during a child's early years is related to a variety of poor short-term outcomes such as delayed cognitive development (measured by IQ tests), and behavior problems.[11] Children experiencing long-term poverty exhibit significantly increased levels of developmental delay compared to developmental delays found in children experiencing short-term poverty.[12] Relationships exist between families with relatively low incomes and increased incidence of child maltreatment (child abuse and neglect), inconsistent discipline practices, and reduced parent-child interaction.[13]

There are also associations between poverty and family stress, and behavior problems in preschool children.[14] Some lifecourse outcomes may depend on the age at which children experience poverty, or on how long those experiences last. For example, failure to complete high school is associated with poverty and welfare use during a child's

adolescent years (12 to 15) but not during early childhood.[15] Longer episodes of poverty also are associated with decreased likelihood of high school completion. There are also associations between poverty and poor nutritional and health outcomes.[16]

It is important to recognize that poverty is not the only factor that can affect a child's outcome. For example, poverty is associated with low levels of maternal education and single parent families.[17] Some studies. however, indicate that children may not be at increased risk for poor outcomes if poverty is the only risk factor present.[18] For purposes of clarity in this discussion, however, interrelated factors such as poverty, single parenthood, and parental educational attainment are treated separately.

Parent's Educational Attainment.[19] Parent education may affect children's educational outcomes. Several studies identify relationships between low levels of mothers' educational attainment and cognitive delay in their children.[20] Those studies also show that children of less educated parents have lower rates of high school completion. As a mother's level of educational attainment decreases, her child has a greater likelihood of placement in a special class for children who are at risk of academic failure.[21] An association exists between lower maternal educational attainment and increased levels of child anxiety.

Single Parent Families. Growing up in a single parent family can affect children's outcomes. Separating the effects of being in a single parent family from the effects of poverty, however, is difficult, since the two factors are highly correlated.[22] Nevertheless, single parenthood is associated with increased risk of dropping out of high school, early family formation, and being out of school and not working; as well as a decreased likelihood of college enrollment.[23] Remarriage reduces, but does not eliminate, the likelihood of poor outcomes such as dropping out of high school or early family formation.

Children who do not live in intact families also can experience higher levels of anxiety and chronic health problems.[24] When income status is included in those analyses, however, the relationship between family composition and children's educational outcomes becomes weaker. Finally, living in a single parent family for a long period, or transitioning to one, can increase social impairments such as low self-esteem and difficulty with social interaction.[25]

Parenting Style. Researchers have identified many associations between family parenting style and child behavior problems.[26] Parental approach to discipline appears to be a very significant factor in both adolescent school performance and predisposition to future juvenile crime.[27] Specifically, punitive or harsh parenting styles, coercive family processes, or indulgent or negligent parenting styles are associated with increased levels of behavior problems in children.[28] Further, some studies find associations between antisocial behavior in children and later episodes of juvenile delinquency.[29]

Home Environment. Home environment refers to a variety of factors that can affect family functioning. Such factors include parent-child interaction, family social isolation,

responsiveness of parent to child, and provision of appropriate toys. Families with an informal network of community or family assistance (not socially isolated) experience lower incidence of child maltreatment.[30] Emotional and verbal responsiveness of the mother, maternal involvement with the child, and provision of appropriate toys during the first two years of life are associated with increased cognitive development by age four and one-half.[31] Aspects of the home environment such as parental aggressive behaviors, lack of maternal warmth, and stressful life events are associated with increased incidence of behavior problems in school.[32] Conversely, higher levels of parent-child interaction are associated with increased school performance for children.[33]

Nutrition. Adequate and proper nutrition during and after pregnancy, and for young children strongly correlates with both short- and long-term outcomes for children. For example, proper nutrition during pregnancy is critical to the normal development of the fetus, and reduction in rates of low birth-weight babies.[34] Inadequate vitamin B intake, or metabolism, during pregnancy also can cause neural tube defects (or incomplete brain formation).[35] In addition, infants and young children receiving inadequate nourishment (for example, inadequate vitamin supplements) are at increased risk for delayed development.[36] School age (six to twelve years old) children in low income families who experience "...prolonged periodic..." bouts of hunger are much more likely to experience conduct disorders than children who are not hungry.[37]

Health. Health also affects children's lifecourse outcomes. One important pathway for such outcomes is low birth weight. Low birth weight children are more likely to experience developmental delays due to higher incidence of physical disorders such as cerebral palsy, congenital abnormalities, or seizure disorders.[38] Low birth weight also is associated with school failure and reduced cognitive development.[39] Many of the causes of low birth weight and premature births remain unknown; however, lifestyle choices can significantly affect the incidence of low birth weight and premature births.[40] Such lifestyle choices include smoking, substance abuse, and maternal stress (caused by economic, domestic violence or other psychosocial factors).

Parental mental health also can affect children's cognitive and social development. For example, maternal depression and parental antisocial behavior can adversely affect a child's behavioral development as young as age three.[41] Finally, general health conditions of children can be important for their development. Chronically ill or frequently injured children can experience developmental delays.[42]***Parental Substance Abuse.*** Many studies have identified associations between maternal prenatal abuse of substances (such as cocaine, opiates, tobacco, alcohol, and marijuana) and poor child outcomes.[43] Such associations include increased incidence of poor child health and developmental outcomes such as low birth weight, birth defects, Fetal Alcohol Syndrome, attachment problems, and reduced cognitive levels.[44]

Parental postnatal substance abuse also can affect child outcomes. For example, parental alcohol and illicit drug use appears to be associated with increased incidence of parental death from suicide or homicide.[45] Other individuals in the household with the abuser also are at increased risk for homicide (for those in households with illicit drug users the risk is

greatly increased).[46] Finally, the frequent incidence of other risk factors complicates analyses that show associations between substance abuse and child outcomes. For example, many behavior problems found in the sons of alcoholics may be due to cofactors such as maternal depression rather than the alcohol abuse.[47] Parental substance abuse also is confounded with poor parenting practices such as negligence and harsh discipline – both of which can affect cognitive and behavioral development.[48]

Family and Neighborhood Violence. Family and neighborhood violence can affect children's lifecourse outcomes. One recent study explores the extent to which inner city children and their mothers witness violent episodes within the home or community.[49] It found that significant numbers of preschool children and their parents had either witnessed, or been a victim of, some kind of violent act. Many of those surveyed identified more than one episode of violence. In addition, parents who had witnessed violent acts were more likely to limit their children's movement, to express fear for themselves and their children, and to limit their children's play outdoors. Such responses to violence can affect a child's development.[50]

A recent survey of the research on family and neighborhood violence identifies several effects of such violence on children.[51] For example, school-aged children who are exposed to violence can develop anxiety and sleep disturbances, and may become inattentive in class. Exposure to trauma in the first three years of life can cause similar disturbances. Further, very young children (under three years of age) also may experience difficulty developing trust and autonomy. Evidence is increasing that both preschool and school age children exposed to chronic community violence and violence in the home may develop Post Traumatic Stress Disorder (PTSD).[52] Among its symptoms are eating and sleeping disorders, anxious reactions, flashbacks, withdrawal, depression, or aggressive behaviors. Neighborhood violence also can affect the ability of parents to parent, which can affect child development.[53] Further, living in a "high risk" neighborhood can increase the incidence of low birth weight.[54]

The Influence of Risk and Protective Factors on Children's Outcomes

While children growing up in homes with family risk factors are more likely to experience cognitive or behavioral delays, this does not always occur. For example, growing up in a very low-income family, in isolation from other risk factors, may not place a child at increased risk for poor cognitive or behavioral outcomes. Many children in seemingly deprived environments have "normal" lifecourse outcomes. Other children in seemingly similar circumstances have very poor outcomes. Researchers have studied why children in seemingly similar environments experience widely different outcomes.

For example, there is evidence that the number of risk factors present in a child's environment may act cumulatively to affect the extent of poor outcomes.[55] Such studies find that the odds that a given child will experience poor lifecourse outcomes increases with the number of risk factors present in the child's environment. For example, a child living with a single parent is likely to experience relatively better outcomes than is a child living with a single parent who is poor, has a substance abuse problem, and has a low

educational attainment.

The research literature also identifies children who would be expected to have poor outcomes based on the presence of risk factors, but who turn out much better than expected.[56] Researchers posit that "protective" factors exist which buffer at-risk children from bad lifecourse outcomes. Examples of protective factors for children include:

- Growing up in smaller families,
- Establishing a close bond with a caregiver in the first year of life,
- Receiving emotional support from one or more close friends,
- Developing a belief that their life has meaning,
- Participation in extracurricular activities (such as sports, or boy/girl scouts).[57]

Researchers also have identified characteristics of children that are more likely to be resistant to poor lifecourse outcomes. Such characteristics include social competence, problem-solving skills, autonomy, and sense of purpose and future.[58] The complexity created by the interaction of risky environments, protective factors, and cumulative risk factors make predicting the outcome for any given child difficult.

Summary. Family risk factors such as those identified above generally do not occur in isolation. For example, poverty, low levels of parental education, and single parenthood are highly correlated. Consequently, sorting out how any specific factor affects later development is difficult. Such knowledge is important in the design of intervention strategies. Experimental early childhood intervention projects have shown an ability to influence family risk factors in a way that improves children's outcomes. These are discussed later in this paper. The next section examines the research on brain development and describes current knowledge about the effects of a stressful physical and social environment on infants and toddlers.

FINDINGS FROM THE BRAIN DEVELOPMENT RESEARCH

Recent research on brain development suggests that how the brain develops during the first few years of life may affect in significant ways the relationship between poverty, stressful home and neighborhood environments, and child lifecourse outcomes. This section examines recent developments in brain research and discusses how a child's environment and early experiences may influence his/her behavior as adults.

Perhaps the most important message of brain development research is that the basic architecture of the brain is set in utero, but the wiring of the brain is only partially complete at birth. An important finding is that the brain continues to develop after birth in response to environmental stimuli. Consequently, during the early years, a variety of environmental factors can affect the development of a child's brain. A discussion of the "nature verses nurture" debate – an ongoing dispute about the relative role of inherited ability or experience in cognitive development and ability – completes this section.

Recent Discussion of Brain Development[59]

Recent research into brain development and function provides new insights about the effects of early life experiences on a child's cognitive and behavioral outcomes.

Genetic Complexity and Brain Development. Perhaps the most interesting set of findings scientists have reported is that a very large number of genes appear to be involved both in basic brain infrastructure and in development of behavior patterns. Scientists have estimated that the number of genes involved in shaping the brain and influencing behavior could exceed half the total number of genes in human DNA.[60]

Defective genes, either alone or in combination, increase both the probability and the severity of mental retardation, developmental delay, or behavioral disorders. One example is the fragile X syndrome, which is a genetic defect that affects production of one of the proteins that allows synapses (connections between brain cells that allow communication and formation of memories) to work effectively.[61] In many instances, however, the existence of a defective gene does not guarantee that a child or adult will exhibit the malady that the gene controls. Genes often must have additional factors such as other defective genes, or some environmental stressor such as substance abuse, violence, or malnourishment in order to express the condition.[62]

Genes also affect the levels of hormones produced naturally by the body. Defective genes can produce chemical imbalances in these hormones.[63] Such imbalances, either in individual hormones or in combination, can affect individual predisposition toward a variety of socially deviant or undesirable behaviors such as thrill-seeking, sexual deviance, impulsiveness, violent or aggressive acts, shyness, alcoholism, and lack of self-confidence. Scientists are making progress in understanding how defective genes affect the production of proteins important for normal brain and nervous system development.[64] These developments have led to some drug and therapy-based treatments and should lead to additional treatments in the future.

Stages of Brain Development. The last two decades have produced significant gains in our understanding of brain development. Several findings are important for this report. Researchers now understand that there is tremendous scope for shaping the brain in the early years of life. Specifically, despite the complex interrelationship among genes in the formation of the brain and in the expression of a variety of mental conditions, such interrelations do not fully explain how the brain develops.

Research reveals, however, that from birth to about age twelve, the brain absorbs sensory experience from the child's environment and continually reshapes itself to accommodate the experiences it accumulates. After age twelve, the rate at which the brain forms connections declines significantly. This design and redesign process occurs in stages. The first stage is the shaping and partial "hard wiring" that occurs in the womb.

The basic structure of the brain begins forming shortly after conception. By the time a baby is born, it has the "wiring" necessary for basic body function and it has most of the brain cells (neurons) it will ever have. During these months in the womb, genes program most of the development of the brain. Over this period, the brain forms about 50 trillion connections (synapses). Fetal stress during pregnancy caused by any of a large number of factors including smoking, substance abuse, or malnourishment can affect development. Figure 1, in Appendix B, provides a schematic view of how brain cells connect and provides basic definitions for the terms used in this report.

The second stage of brain development occurs during the first three years of life. During this time, the rates of formation of brain cell connections (synapses) increases dramatically in response to environmental stimuli and sensory experiences absorbed by the infant. For example, scientists estimate that the number of synapses increases to about 1,000 trillion by eight months of age in a normal infant and continue forming at a high rate until about age three.[65] Each brain cell can extend up to 15,000 connections to other brain cells. These connections, however, are not permanent. Exposure to sensory experiences such as sound, sight, and smell from the child's environment form most of these connections. Repeated reinforcement through repeated sensory input is critical in order for the connections to remain viable. These connections occur as the infant learns to coordinate its muscles, to develop its sensory system (vision, hearing, touch, and taste), and to acquire language capability. The number of connections is important because such connections allow people to store experiences (form memories), think and solve problems – all of which are part of the development of cognitive processes.

Our understanding of the importance of sensory experience comes from a series of animal and human studies that together provide strong evidence to support the need for infant stimulation from birth. Some of these studies identify how the absence of sensory stimulation will cause animal brains to use areas dedicated to the nonfunctioning sensory organ for other purposes.[66] Other animal studies suggest that a more stimulating environment can cause young rats to develop better problem-solving abilities.[67] In addition, those studies found that the rats in the stimulating environment had up to 25 percent more brain connections (synapses) than the rats in poor environments (who did not have access to toys or mazes).

By the age of three, the rate of new synapse formation slows and the young brain enters a new stage. Studies using diagnostic equipment such as PET scanners, however, show large and sustained increases in brain activity during this period. The brain appears to move into a mode of consolidating synapse formations – a "use it or lose it"[68] phase. This consolidation and reinforcement process continues until about twelve years of age. After the age of twelve, brain patterns become more set and learning subjects such as foreign language becomes much more difficult. Synapse formation continues into old age.

Recent Findings on the Effect of Cognitive Stimulation and Early Experience on Children's Brain Development. Several studies of infants and very young children show that infants as young as eight months old are able to identify sound patterns. For example, babies can pick repeating nonsense words from streams of seemingly random sounds.[69] In addition, the effects on children of more talkative parents versus less talkative parents show that children of the more talkative parents develop significantly larger vocabularies by two years of age. Further, this advantage continues through the child's early years of school.[70] Finally, children who hear more words per day and who receive positive responses from caregivers more frequently, on average, will report higher measures of cognitive development.[71] Such effects were evident by three years of age. Taken together, these studies provide strong support for the notion that the brain is dynamic and in need of both sensory experience and cognitive stimulation from birth.

A body of experimental evidence also demonstrates that careful, intensive early intervention can protect infants and young children against delayed cognitive development.[72] The next section discusses those studies in conjunction with other experimental evaluations. Since such studies demonstrate that it is possible to maintain near normal cognitive development in children from families with low cognitive functioning mothers, those studies provide support to brain research findings. Appendix C summarizes in detail four experimental intensive developmental education projects for children from six months to five years of age.

Recent Findings on the Effects of Environmental Stress on Children's Behavioral Development. Environmental and family stressors, such as family or community violence, substance abuse, child abuse, poorly functioning homes, low parental educational attainment, and poverty can affect brain development. Animal studies have shown that such stresses can produce abnormal levels of certain chemicals called neurotransmitters that control the formation of brain connections. These neurotransmitters affect the ability of animals to thrive and relate to each other.[73] Further, if a stressful condition is prolonged, the brain is less likely to develop fully, resulting in both significantly smaller brain mass and loss of synapses.[74]

Infants who are subject to stressful environments also exhibit abnormal levels of serotonin and adrenaline in their systems.[75] When such abnormal levels of these and other neurotransmitters such as dopamine persist, scientists believe that the brain begins to "rewire" itself in ways that enhance a child's ability to survive. This rewiring, however, does not support the development of learning and social skills. Rather, such rewiring for survival supports the development of a variety of antisocial behaviors.

Scientists have made progress in understanding how such stresses affect brain development[76] and a child's behavior.[77] Abnormal levels of certain chemicals caused by response to stress can cause such brain rewiring. Further, environmental and family stress may trigger "normally" dormant genes into action. Together, such processes can affect significantly a child's ability to achieve a normal life.

The "Nature Versus Nurture" Debate

The nature verses nurture debate has raged since the last century. At its most basic level, the debate is about whether genetic factors play the dominant role in cognitive development or whether environmental factors play the dominant role.[78] Other issues such as the meaning of race/ethnic differences in intelligence and questions about what intelligence tests measure have become part of this debate over the years.[79] Full discussion of those issues is beyond the scope of this report.

The nature-nurture debate's importance for this report lies in its implications for early childhood intervention to sustain normal cognitive development for children who live in home and neighborhood environments that increase their risk for cognitive delay. For example, if heredity plays the primary role in children's cognitive development, then one can argue that a child's parents preordain the child's cognitive outcome. Alternatively, if environment and sensory experience play an important role in a child's cognitive development, changing a child's environment or sensory experiences can affect a child's cognitive development.

There is no consensus about the degree to which inheritance affects cognitive ability. To some extent, however, these issues are irrelevant. There is widespread agreement[80] that both genes and environment play a role in cognitive ability and other competencies.[81] There also is significant evidence that this role is dynamic – not fixed at birth.[82] Thus, many researchers now consider the debate about nature or nurture ended. In its place, many scientists now discuss nature and nurture, as well as its many complexities. Consequently, well-designed intervention programs may play a role in preventing or reducing cognitive delay.

Common Themes

The brain research literature provides striking evidence that an early focus on children can pay big dividends later in life. These findings support the idea that while the shaping of the brain continues long after birth, the first years are critical for the full development of a child's cognitive abilities. Research on brain development also provides important support to the literature examining the relationship between family risk factors during childhood and poor lifecourse outcomes for children in such environments. This work has not fully identified all the links among risk factors and child outcomes, because such a project is very complex. Nevertheless, these bodies of research point to ways in which families and society can ameliorate the effects of environmental stress on children. The next section examines a number of high-quality experimental interventions that have shown promise in offsetting the effects of stress on young children and their families.

EARLY CHILDHOOD INTERVENTIONS AFFECT CHILDREN'S OUTCOMES

The early brain development research described in the previous chapter supports the efficacy of intervention and support programs designed to influence family function and child development during a child's first five years of life. Research shows that children who grow up in poverty and/or stressful environments are at risk for reduced intellectual and educational attainment. These children also are at risk for a variety of poor lifecourse outcomes.

Four early childhood intervention strategies, in particular, have attracted considerable interest recently and are the focus of this section. These strategies are: (1) preschool; (2) child development; (3) home visiting; and (4) traditional day care programs. While policy makers often discuss such intervention strategies as though they are isolated from one another, most early childhood interventions incorporate multiple strategies. For example, preschool programs often include a parent education component such as home visits or group meetings and frequently include links to childcare.

Other early childhood intervention strategies include nutritional and primary health care interventions. Such programs include the Special Supplemental Food Program for Women, Infants, and Children (WIC); the Early Periodic Screening, Diagnosis, and Treatment program (EPSDT) – known as the Child Health and Development Program (CHDP) in California;[83] and Public Health Service immunization programs. While not discussed in this section, nutritional and primary health care early childhood intervention strategies also provide significant benefits such as reduction of low birth weight babies, improved nutrition for infants, and reduction of communicable disease to at-risk children.[84]

Preschool Programs

One group of early childhood intervention projects – early education programs for three and/or four year old children – address both cognitive delay and behavior problems (sometimes identified as social competence skills) facing at risk children[85]. By reducing the severity of cognitive delay and behavior problems, such programs can affect a variety of lifecourse outcomes. Cognitive stimulation and social competence curricula that form a central part of high-quality preschool programs could improve a child's readiness for kindergarten.[86]

Preschool programs typically include both cognitive stimulation and social competence curriculum. While the important feature of such programs is early education, it is common for such programs to include a childcare component. Childcare can be either an integral part of the project or a related service. Some preschool programs, e.g., Head Start, provide parenting education, nutritional and health services, and connections to other community services. Because preschool programs are widespread, there are many program evaluations. The quality of those evaluations, however, is subject to some debate in the evaluation literature.[87]

Early Demonstration Projects. Several demonstration projects from the 1960s have had

long-term follow-ups, and these provide information about the effects of preschool on children's lifecourse outcomes.[88] For example, the Perry Preschool and Early Training projects, which use a small number of children in a relatively controlled environment, tested concepts that led to development of Head Start and other programs. Such projects typically use relatively sophisticated methods to isolate the effects of the project on children receiving the treatment. Among the findings from these demonstration projects are:

- Treatment children were significantly less likely to be in special education or retained in grade, and more likely to complete high school.[89]
- Treatment children exhibited short-run cognitive improvement and more long-run achievement test improvement.[90]
- Treatment children had significantly fewer and less serious interactions with the juvenile justice system, greater economic success, and greater likelihood of attending college.[91]

Large Scale Preschool Programs. Preschool programs are widely available for children in families who are able to afford such care. Beginning in the 1960s, federal programs such as Head Start and Compensatory Education, now called Title I, began to serve low-income children. Subsequently, many states, including California, began providing preschool services. Such public programs generally received less funding per child than was spent on the high-quality demonstration projects. These public programs, however, do not serve all eligible children.

Many evaluations of Head Start and Title I preschool programs exist.[92] Among the evaluation findings are:

- Program participation maintains cognitive development during the program; however, advantages conferred by program participation typically dissipate within a few years.[93] One Title I program evaluation, however, found that children who participated in the program for a longer period of time have higher achievement test scores by the sixth grade than children who participated for a shorter period of time.[94]
- Head Start evaluations also have shown positive short-run improvements in behavioral development; however, such "gains" appear to dissipate after a few years.[95]
- Head Start evaluations have found improvements on a variety of nutrition and health outcomes.[96]

Assessing evaluations of Head Start and Title I programs is complicated by a variety of factors including quality differences across program sites, nonrandom selection of participants, and lack of adequate research designs.[97] The lack of long term outcomes from such programs, when compared to findings from evaluations of model projects, is disheartening.[98] Nevertheless, evidence in the literature suggests that local Head Start and

Title I preschool programs can improve a child's academic performance and social competence in the short term.

Child Development Programs

Another group of early childhood intervention strategies is the child development program. A child development program is a long-term, structured, and intensive educational day care program designed specifically to offset potential cognitive delay for at-risk infants and toddlers. Such programs generally begin before the infant is six months of age and continue until the child enters kindergarten at age five. Two main variations of such intensive programs exist. One version is the cognitive stimulation program. Such programs stress reading to children, psychosocial stimulation, and caregiver-infant interaction. The purpose is to overcome the effects on children of growing up in particularly risky families.[99] The findings from four cognitive stimulation focused projects (summarized in Appendix C) are influential because they provide support both for physiological findings from the brain development research and for early childhood intervention.

- These programs show that the treatment children retain normal or near normal, cognitive development, while the control children experience significant cognitive delay.[100]

- Treatment children in the least advantaged families receive the most benefit from such programs. Specifically, for the children of mothers with IQ scores below 75, researchers found IQ score[101] differences between treatment and control group children of up to 22 points.[102] Further, treatment group children maintained near normal cognitive development.[103] These differences for the experimental children continued to 12 to 15 years of age.[104]

- Treatment children have fewer referrals to special education and are less likely to be retained in grade.[105]

A second intensive child development program approach is one that focuses on family support and child social competence. Such programs include child care from infancy to kindergarten, home visiting focused on family functioning, and parent education at the child care center. Two programs that incorporate this approach are the Syracuse University Family Development Research Program and the Brookline Massachusetts Early Education Program.[106] Each has shown some promise. Specifically,

- Treatment children whose parents had low educational attainment were twice as likely to read without difficulty than were children in the control group.[107] Nevertheless, early cognitive improvement for treatment children dissipated by kindergarten.[108]

- Treatment children exhibited higher rates of success on other mastery and social skill criteria. In particular, teenage girls exhibited higher ratings for self-esteem and

impulse control.[109]

- Treatment children (at 15 years of age) had significantly fewer and less costly interactions with the juvenile justice system.[110]

Developmental day care programs such as those discussed are very intensive and costly. Nevertheless, targeting such programs to specific populations may provide significant benefits to society.[111] Notwithstanding the potential cost of such programs, they provide important information about the ability of intensive early childhood interventions to reduce the effects of risky environments on cognitive development and social competence.

Home Visiting Programs

Home visiting strategies are a third group of early childhood intervention programs. Home visiting refers to a set of preventive interventions in which specially trained professionals such as registered nurses or teachers, or paraprofessionals (individuals without professional licenses) make contact with and engage families in the home. Two approaches to home visiting exist. One approach emphasizes early education to improve parent-child interaction and parenting skills. The other approach emphasizes maternal lifecourse outcomes to improve health and nutritional outcomes, reduce child maltreatment, increase family functioning, and reduce subsequent pregnancies.

Evaluations of such programs have shown a variety of short- and long-term improvements in family functioning and children's lifecourse outcomes.

- Home visiting programs that are designed to improve child cognitive development show mixed results; however, some trials have shown sustained improvement in cognitive development.[112] Intensity of home visiting appears to affect cognitive development outcomes especially for low SES children.[113]

- Home visiting trials that focused on family functioning have reported improvements in a variety of outcomes. Such improvements include: reduced smoking during pregnancy, fewer low-birth-weight babies, fewer reports of child maltreatment, higher employment, reduced use of welfare, and fewer subsequent pregnancies.[114] A 15-year follow-up of one project reports that the most at-risk families[115] reported fewer subsequent births, greater time between births, fewer months of AFDC receipt, fewer impairments due to substance abuse, and fewer parental arrests.[116]

Several studies where home visiting is the primary strategy of the early childhood intervention program also have included other strategies such as parent groups, health screening, or childcare to form a combination program.[117]

- These studies found a variety of positive behavior outcomes for treatment children. Treatment group boys in two of the studies were significantly less likely to have behavior problems during their elementary school years and used fewer special services.[118] A ten-year follow-up of one project found that treatment children had

fewer serious absentee problems, and participants had better ratings of school adjustment.[119]

- Treatment group children exhibited greater cognitive development at three years of age, but those gains dissipated by kindergarten entry.[120] Treatment children in one study, however, performed better on achievement tests given during elementary school.[121]

- Two studies found both short- and long-term effects for treatment group parents. For example, husbands of mothers who married after recruitment had more stable employment.[122] Mothers in the treatment group were more likely to be in school at follow-up, were more likely to talk with their children, and tended to more appropriately handle fussy children.[123] A ten-year follow-up of one project, found that mothers were more likely to have smaller families, be "self-supporting," and have more years of education.[124] Further, treatment families averaged about $700 per family in welfare benefits while control families averaged about $2,705 in benefits.

Home visiting is an important family support strategy for families with newborn children.[125] Such a strategy, however, may be of greatest benefit to families who are most at risk for family dysfunction. Reviews of the home visiting literature also suggest that effective home visiting programs must maintain high standards.[126] Such standards include being well managed, setting tightly focused goals, focusing on results, using well trained home visitors and internal quality improvement practices, and effectively supervising team members.

Traditional Day Care Programs

Traditional day care refers to all childcare arrangements other than the intensive, structured developmental day care arrangements discussed above. Traditional day care is a set of programs created primarily to care for infants, toddlers, and small children while their parents are working, in school, or otherwise unavailable to care for them. These childcare programs also may have family support effects by providing at-risk children a respite from family problems. Finally, such programs are in the front lines of efforts to increase employment among welfare recipients. Several recent studies show that high-quality[127] day care can support the cognitive and psychosocial development of children. Among the findings are:

- Children from low-income families who attend childcare centers during their first three years score higher on reading recognition and math tests at age five or six than children who do not attend such care. The benefits of such care diminish for children in "enriched" home environments.[128] Entry into childcare by age one also may result in higher achievement test scores as well as higher school adjustment ratings at age eight.[129]

- Quality of childcare settings and the length of time a child is in formal childcare also

can influence cognitive and social development.[130]

The studies cited in this section, while of high quality, do not use formal control groups. Consequently, the cognitive and social development results should be viewed with caution. Nevertheless, the need for childcare due to welfare reform, and the increasing number of two-parent working families, suggests that both children and families can benefit from high-quality childcare arrangements.

Community-Based Family Support and Family Literacy Programs

Community-based family support programs encompass a variety of programs that include home visiting, family resource centers, and family literacy. Home visiting as a family support strategy was discussed earlier. Family resource centers provide families in low-income neighborhoods with access to information and often provide other services such as case management, referrals to social and health services located at other sites, and social or health services on-site. Such centers typically are part of a larger community- or school-based collaborative project and generally have broader goals such as neighborhood development or crime reduction than the goals of most early childhood intervention strategies.[131]

Family literacy is another community-based family support strategy. Such programs provide adult literacy services to parents, group reading to children, and parenting education and parent-child reading training to family members. Using literacy programs as a family support strategy is relatively new and few evaluations exist. One summary of the research suggests that for families that participate in such programs, the parents complete more education and their children improve their school performance.[132]

Benefit-Cost Studies

Early childhood interventions generate costs before they begin providing benefits. Often such benefits take years to accrue. The costs to society of poor lifecourse outcomes are well known.[133] Consequently, it is reasonable to ask whether the benefits of more comprehensive early childhood interventions exceed the costs of those interventions. Two high-quality benefit-cost studies suggest that benefits can outweigh their initial costs – even when accounting for the difference between the timing of the investment and the return.

The Perry Preschool Project, for example, conducted a detailed benefit-cost analysis as part of its lifecourse outcome analysis.[134] Those analyses, completed when treatment and control children were 29 years old, reported over eight dollars in benefits for each dollar in program costs. The main sources of benefits were reductions in criminal justice costs, including costs to victims; increased earnings for treatment children when they became adults; and reduced costs to K-12 education for special education, retention in grade and other expenses. This study did not include estimates of certain quality-of-life benefits that are hard to quantify, such as the value of increased success and satisfaction with school or work, better timing and spacing of births, or quality of leisure.

A more limited benefit-cost analysis was that done for the Elmira Home Visiting Program. This study compared the costs of the home visiting program, including the cost of services used by participants, to government program savings and increased earnings from employment.[135] The study found that for the low-income portion of the sample, benefits exceeded costs by a small amount per family. For the entire sample, however, benefits had offset about half of the program costs. The primary program benefits were lower Medicaid and welfare costs, reduced child protective services costs, increased taxes from increased income, and reduced incidence of second births.

Other studies such as the Yale study mentioned earlier provide additional information about cost savings.[136] It did not consider, however, whether cost savings attributed to the intervention exceeded the program costs. There are only a limited number of benefit-cost analyses of early childhood intervention programs; thus, generalization from the existing studies is difficult. Nevertheless, the findings generally support their efficacy.[137]

Summary

Maintaining cognitive development and social competence can significantly improve the likelihood that at-risk children will succeed in kindergarten and experience better lifecourse outcomes. Improving family functioning also can improve lifecourse outcomes for parents and children. Such programs, however, are not "magic bullets." They cannot fully compensate for the effects of environmental stresses and poor cognitive stimulation during early childhood. Notwithstanding this qualification, high quality programs can produce benefits to society that exceed their costs.[138] Many successful experimental projects include more than one intervention strategy. Consequently, some analysts now argue that effective early childhood interventions must be part of a system of interventions, rather than a set of relatively autonomous programs.[139] Finally, some policy analysts think that early childhood interventions should be a part of larger community-based efforts designed to reduce crime, improve neighborhood institutions, and improve economic development that may enhance efforts to create neighborhood renaissance.[140]

EARLY CHILDHOOD INTERVENTION PROGRAMS IN CALIFORNIA

State, federal, and local governments operate numerous early childhood programs in California. Some programs such as Head Start, WIC, and childcare are located throughout the state. Other programs are demonstration or pilot programs designed to determine the feasibility of moving from small-scale operation to statewide operation. This section describes some of the early childhood programs found in communities across the state.

Home Visiting Demonstrations

The Office of Child Abuse Prevention in the Department of Social Services funds many projects. Examples include:

- ***Healthy Families America (HFA)/Healthy Families California.*** Healthy Families America is a collaborative effort to launch a national home visiting initiative. HFA is an affiliate of the National Committee for the Prevention of Child Abuse. California's affiliate provides support and guidance to home visiting projects within the state. The program focuses on family function. Home visitors contact clients when they are in the hospital giving birth, and then begin home visiting services with weekly visits, which become less frequent based on periodic assessments of family need.

- ***San Diego Healthy Families America Replication Study.*** The California Department of Social Services, Office of Child Abuse Prevention (OCAP), two foundations, and the Child and Family Research Group at Children's Hospital in San Diego, agreed in 1995 to fund a five year home visiting clinical trial. This project uses the Healthy Families America (HFA) training materials and home visiting approach, but supplements the HFA model with group sessions for parents and children. This project will test whether the modified HFA model is feasible in California.

- ***Office of Child Abuse Prevention (OCAP) Grants.*** In 1994, the OCAP funded ten three-year project grants of about $150,000 each to local collaboratives to assess various home visiting models as part of larger efforts to reduce the incidence of child maltreatment.

- ***California Safe and Healthy Families (Cal-SAHF) Family Support Home Visiting Pilot Projects.*** The Cal-SAHF project tests the efficacy of a "best practices" model of intensive paraprofessional home visiting based on the San Diego Healthy Families America clinical trial. The OCAP seeks information about local agency needs including guidance and technical assistance that could lead to expansion of the Cal-SAHF model in future years. The OCAP is awarding five three-year grants of $954,000 each.

- ***Other Home Visiting Efforts.*** Home visiting also is a component of other prevention and early intervention programs found in California. Currently, some school- or

community-based family resource centers, short-duration health care programs, and Head Start programs provide limited home visiting services. Further, Child Protective Services programs often make use of intensive, short duration home visiting in their Family Preservation programs.

High-quality, intensive home visiting projects that focus on family support, adult-child interaction, and child stimulation, are relatively recent innovations in California's social service delivery system.

Family Literacy Programs

Literacy programs traditionally have focused on adults who need improved literacy skills. Beginning in the late 1980s, California, along with some other states and the federal government, began experimenting with family literacy programs that are operated through community-based centers such as libraries and community centers. Examples in California include:

- ***Even Start.*** Even Start, established in 1988, is a federal program funded as part of the Title I Compensatory Education Program. It provides funding to local sites for services to eligible families with children under the age of seven. The Even Start program has three components: (1) early childhood education; (2) parent education such as ESL or GED work; and (3) parenting education.

- ***Families For Literacy (FFL).*** The California State Library operates the FFL program, established in 1988. Eligible families must have at least one child under the age of four. The programs, staffed primarily by volunteers, provide tutoring to adults, group reading activities for the children, and instruction on how to read to children to promote literacy. Currently, the FFL program funds 57 local operators who serve more than 2,500 families.

Preschool Programs

California has been a national leader in funding preschool programs operated by school districts and other community-based agencies throughout the state. Current state and federal funding, however, is insufficient to provide preschool slots to all eligible children.[141] For example, the federal Head Start program enrolled about 72,600 in 1996-97, while the State Preschool Program served about 45,000 children. The Governor's 1998-99 budget proposal contains funding that is expected to be sufficient to provide state preschool services to all four-year-olds in low-income families by the 1999-2000 school year.[142]

- ***Head Start.*** Head Start is a federally funded preschool program targeting children ages three, four, and five from low-income families. Funds flow directly from the federal government to a mix of grantees that include private for-profit, private non-profit, school district, county office of education, and religious organizations. Grantees have parent oversight committees and often provide supplemental services

such as home visits, parent education, and nutritional counseling.

- ***State Preschool.*** California provides funding for local preschool programs for children in low-income families. This program, administered by the Child Development Programs Division in the California Department of Education, funds both school district based and private non-profit programs. State Preschool sites typically do not provide the range of supplemental services found at Head Start sites.

- ***Title I Compensatory Education Preschool Programs.*** Under the Elementary and Secondary Education Act, the federal government provides so-called "Title I" funds to school districts for compensatory education programs. School districts can use a portion of their Title I funds for preschool programs to fulfill federal requirements.

- ***School District Sponsored Parent Participation Preschools.*** Some school districts use Adult Education funds and parent fees to provide preschool programs. Such programs have parent education components in order to qualify for Adult Education funding.

- ***Private Preschool Programs.*** Many children in California attend private preschools. Private preschool programs include centers operated by religious institutions, private non-profit organizations, and private for-profit companies. Such programs often offer integrated childcare services for children from infancy to kindergarten. Some programs also offer kindergarten and early elementary school programs.

- ***Universal Preschool Task Force.*** Delaine Eastin, Superintendent of Public Instruction, recently announced the formation of a task force to determine the feasibility of establishing a universal preschool program for three- and four-year-old children.

Child Care

The California Department of Education (CDE) and the California Department of Social Services (CDSS) administer state and federal funds to provide child development and child care services for low-income families. Eligible families receive access to a variety of childcare centers or licensed family childcare providers; or receive a payment certificate to purchase childcare services. Some funds also support local Resource and Referral Agencies that provide services to families seeking childcare.

The CDE estimates that its programs provided care for about 167,000 children in 1996-97.[143] This estimate, however, includes some children in the state preschool program. Increased funding for child development programs during the current fiscal year and proposals for further funding increases in the Governor's Budget should increase enrollments to almost 245,000 children. In addition, the Department of Finance estimates that funding increases in the Governor's Budget would provide about 171,000 spaces in childcare programs administered by the CDSS.[144]

- ***School District Childcare Services.*** Many school districts operate subsidized childcare facilities to provide before and after school childcare for children. Funds for such programs come from a variety of sources, including parent fees.

- ***Private Child Care.*** Private licensed and unlicensed providers supply most of the childcare services in California. Many of these facilities provide childcare that is funded by CDE and CDSS programs. Among the providers are individuals in homes, churches, private childcare centers, neighbors, and relatives. Some of these services receive indirect subsidies through federal and state income tax credits.

- ***Child Development Programs Advisory Committee (CDPAC).*** The CDPAC, created in 1965 as the Governor's Advisory Committee on Preschool and Educational Programs (AB 1331, Unruh), provides policy recommendations to the Governor and the legislature on child development issues. In addition, it advises the CDE in the development of its State Child Development Plan, reviews the effectiveness of child development programs and children's services, and provides support to local planning bodies.

Individuals with Disabilities Education Act Programs

Under the federal Individuals with Disabilities Education Act (IDEA), California operates two statewide programs for children who have, or are at risk for, developmental delay or disability. One program, operated by the Department of Developmental Services (DDS), is for children from birth to three years of age (known as Early Start in California). A second program provides services to children who are three and four years old. The intent of these programs is to provide services such as assistive technology; counseling; home visits; hearing, speech and physical therapy; infant development and educational programming; and transportation for eligible children and their families. Further, the federal law intends that such services will form a "continuum of services" – the services will be coordinated and seamless – for children under five years of age. The DDS estimates that they serve about 30,000 children under the age of three in Early Start. The CDE estimates that it serves about 55,000 three to five year old children in Special Education.

CalLEARN Program

The CalLEARN program, which is part of California's welfare program, provides help to teen parents in overcoming barriers to school completion. Its services include case management, counseling, childcare, and transportation; and economic incentives to increase academic performance and complete high school. This program is a family support program in that it provides a teen and her child with access to services such as counseling, parent education, and childcare.

California Healthy Families Program

Chapter 623, Statutes of 1997 (AB 1126, Villaraigosa) established the California Healthy

Families Program for children in low-income families. This program provides free- or low-cost health insurance for children of families that do not have such health insurance. The Governor's Office estimates that 580,000 children are eligible for health insurance coverage under this legislation. Such an increase in coverage for previously uninsured children is an important piece of most prevention agendas.

Early Childhood Initiatives

Interest in early childhood initiatives has increased in the past year. Two examples of recently announced initiatives are:

- ***California Healthy Families and Children First Initiative***. This proposed ballot initiative, currently in the signature gathering stage, would increase tobacco taxes by $.50 per pack to fund various early childhood programs and a tobacco health awareness campaign. Early childhood programs funded by the initiative include parent awareness campaigns and parent education programs; preventive health services such as immunization, and vision and dental care; and pre- and postnatal social services such as home visits and childcare. The initiative would create state- and county-level commissions to coordinate the development of service plans, and the initiative would establish county trust funds to finance local programs.

- ***Governor's Early Child Development Initiative.*** In his most recent budget, Governor Pete Wilson proposes to increase spending on the State Preschool Program over the next two years by an additional $100 million, to a total of about $175 million.[145] In addition, his proposal includes incentives to school districts to encourage the use of Title I funds for preschool programs. The Governor expects these proposals to provide access to preschool for all four-year-old children in families with incomes less than the federal Poverty Income Guideline who are not otherwise served by preschool programs.

Community Collaboration Demonstrations

State and local governments in California operate numerous community- or school-based service delivery collaboratives. Social service, education, and other public and private agencies participate in such collaboratives in order to provide services to clients more effectively. Many collaborative efforts provide some services to families with young children; however, early childhood interventions are not always their focus. Some of these projects have moved beyond the demonstration stage while others are pilot projects. These projects include:

- ***Healthy Start Program.*** Chapter 759, Statutes of 1991 (SB 620, Presley) established the Healthy Start Support Services for Children Grant Program. The Healthy Start Program provides grants to school sites to form comprehensive family-oriented school-linked collaboratives among social service, education, local governmental services, and health providers. Healthy Start has the goal of improving children's educational and lifecourse outcomes. Governor Wilson announced, as part of his

Early Childhood Development Initiative, a proposal to fund efforts by Healthy Start sites to reach families with children that are not yet of school age.

- ***Youth Pilot Project.*** Chapter 951, Statutes of 1993 (AB 1741, Bates) authorizes six counties to combine state and federal funds in order to provide more responsive services. Counties participating in the pilot project must use such combined funds to tailor services to the needs of low-income, multi-problem families and their children. The unique feature of this project is the ability of counties to design integrated service programs and to seek waivers of state regulations and federal restrictions of funds to establish more effective community-based service delivery systems.

- ***Juvenile Crime Prevention Initiative.*** The 1994 Budget Act appropriated funds to implement the Juvenile Crime Prevention Initiative (JCPI). This is a five-year, 12-site demonstration project designed to provide a coordinated set of services for families from birth to adolescence. Each grantee must collaborate with existing public and private service providers, must be community-based, and must include an oversight council comprised of community leaders. This demonstration represents a test of integrated service delivery with prevention and early intervention components.

Current collaborative efforts underway throughout the state could provide support for early childhood intervention systems.

Summary

Federal, state and local governments in California offer many early childhood programs. Many of these programs, however, do not receive sufficient funding to provide services to all eligible children.[146] While the variety of programs is extensive, those programs often are not well coordinated. Evaluation and assessment of program quality and success are infrequent. Consequently, little formal information about program effectiveness exists.

POLICY ISSUES

The research and evaluation literature supports the efficacy of early childhood intervention programs. Successful small-scale research projects, however, do not ensure that implementation of high-quality, statewide programs is possible. This section examines some of the most important policy issues concerning the development of a comprehensive, statewide early childhood intervention system. Included in this discussion are policy options for legislative consideration.

What is the Role of the State in Early Childhood Interventions?

An active debate is occurring regarding the extent to which early childhood interventions warrant societal, and more particularly, government intervention.[147] In part, this debate is about the primacy of the family and its role in early child development. In part, this debate also is about the extent to which society has a role in ensuring that children receive adequate cognitive stimulation and freedom from environments associated with the development of behavior problems.

It is widely accepted that families have primary responsibility for their children, and the Supreme Court has limited the role of government to intervene in family decisions. Society and the courts, however, make an exception to this principle when a family has engaged in child maltreatment. Thus, an argument can be made for early childhood interventions to help children developmentally, with full agreement of the parents.

Many parents suffer financial, emotional, or mental setbacks that can endanger family functioning. Such families could benefit from voluntary early interventions such as home visiting programs or respite childcare to help recover from setbacks. Other families need both parents to work in order to provide an adequate family income. In these circumstances, families often must rely on childcare and preschool for their children. Such families also could benefit from family support services such as home visiting. In other cases, some parents lack the knowledge or ability to provide the cognitive stimulation and coherent social environment needed in order for children to avoid developmental delay. Voluntary early childhood interventions could provide support for families and could reduce the need for more expensive crisis interventions such as Child Protective Services, welfare, medical, or remedial education services.

Options

- The legislature may wish to consider convening a task force that includes a wide range of views to address concerns and formulate options for the delivery of early childhood services. Primary consideration could be the development of a statewide policy that supports alternative ways to achieve goals such as the prevention of cognitive and behavioral delay.

- The legislature may wish to consider developing a set of awareness-building strategies such as television spots or brochures designed to inform communities of the goals and

objectives of such policies. The focus of such strategies might be on the importance of supporting families to ensure that children receive adequate and appropriate cognitive stimulation, alongside a positive, loving home and community environment.

- The legislature may wish to consider enlisting health care providers, schools, churches, libraries, and other community-based organizations as participants in locally focused service delivery networks. Such networks could leverage existing community resources including libraries, community based organizations, and churches, as well as collaborative efforts including Healthy Start, AB 1741, Success for All, Beacon Schools sites (San Francisco),[148] and other community collaboratives. These networks could coordinate with existing public and private service agencies including child welfare services, county mental health, and community health care providers.

- The legislature may wish to consider developing strategies to clarify policies that assert the primary responsibility of parents to ensure the normal development of infants, toddlers, and young children. In this regard, the legislature may wish to clarify the purpose of early childhood programs of the kind discussed above to support parents in fulfilling their responsibilities.

Can (Should) We Target Early Childhood Intervention Programs on High Risk Groups?

Many researchers studying early childhood issues suggest that such programs should be preventive in nature. In that context, all families with children under the age of five would have access to services regardless of risk. Actual use of services by a given family would be that family's choice.

Alternatively, some researchers suggest that early childhood intervention programs should target at-risk populations. Those researchers argue that our knowledge base is such that only the more risky families are likely to generate benefits of sufficient size to recapture program costs. There is some merit to the latter strategy for two reasons. First, studies such as the Elmira Home Visiting and Abecedarian projects suggest that individuals in the most disadvantaged families show the greatest benefit from intervention. Second, some projects would require significant capacity-building and such efforts require time. Thus, targeting at-risk populations might allow a more orderly implementation strategy, while focusing on families with the greatest need.

Options

- The legislature may wish to consider funding new, large-scale (perhaps countywide) pilot projects designed to provide information about appropriate targeting, types of intervention, and approaches to integration of strategies as part of a statewide implementation of such programs. The goals of such pilots could include determining successful ways to include variation in local need, and whether grantees could develop internal quality improvement processes. Such legislation could include outcome-based evaluations, and the flexibility to adjust agreed upon intervention strategies based on

knowledge gained during implementation and early operation.

- Alternatively, the legislature may wish to provide additional funding to existing projects such as AB 1741 and Healthy Start to test large-scale (perhaps countywide) pilots of targeted early childhood intervention strategies. Such pilots should focus on incorporating the essential elements of successful early childhood intervention demonstrations with existing knowledge gleaned from community- and school-based collaborative projects. In addition, the pilots should clearly enunciate results-based goals and objectives. Such pilots should include built-in evaluations designed to develop knowledge about implementation, project operation, goal attainment, and analysis of what does and does not work.

Do We Need Yet Another "Program?"

Many programs are small demonstration programs and operate relatively independently from other programs. Some programs include provisions that emphasize the desirability of collaborating with other service providers in order to improve program effectiveness and efficiency. Notwithstanding collaborative efforts, the culture and diverse funding streams of many organizations and programs is such that integration of services at the neighborhood or community level is difficult or impossible. Some researchers studying collaborative or integrated service delivery issues now suggest that creating additional independent programs would only make the current patchwork of services more complex and less hospitable to families.[149] To that end, the state may wish to consider how new intervention strategies interact with existing services.

Options

- The legislature may wish to consider establishing a task force to determine alternatives for more effectively using local collaborative efforts such as Healthy Start, "AB 1741," and Systems of Care[150] models for the delivery of early childhood programs. Such programs could form a base for further integration of early childhood programs.

- The legislature may wish to consider establishing neighborhood-level pilot projects to test the concepts needed to create sustainable community-based strategies for children and families using knowledge from Systems of Care, Healthy Start, AB 1741, and other local projects. Since such pilots would emphasize community-based strategies, they also may want to assess the effects of collaborating with community police, welfare, and community and employment development agencies.

- The legislature may wish to consider seeking federal waivers to enhance and expand California's Early Start program. Such an expansion could serve a broader group of families by using a more inclusive definition of children who are at risk of cognitive or behavioral delay due to family risk factors.

- The legislature may wish to consider establishing a state level evaluation and technical assistance office to support local projects. This office could provide technical

assistance and training for local efforts, and could provide evaluation information to the legislature, the Governor, and local agencies for use in future policy development.

What Do We Need to Know in Order to "Go-To-Scale" with Comprehensive Early Childhood Intervention Strategies?

Many of the prevention/early intervention studies cited in this paper are studies with small numbers of participants. For example, the Milwaukee Project included only 35 children, and both the Carolina Abecedarian and Perry Preschool Projects studied about 120 children each. Other studies, however, included larger samples. Moving from a demonstration project to full implementation of the program, which may seem simple, is very complex. Significant issues arise when attempting to transform small-scale programs into statewide efforts designed to serve an entire population[151].

Among the issues to decide is whether to replicate the demonstration project everywhere. Specifically, this entails determining whether the program will have the identical elements and policies in each community. Many of the clinical trials summarized in this paper include more than one component. Further, they typically have very detailed designs in order to make evaluation possible. Many analysts who study such "going-to-scale" issues stress the need to make any large-scale program flexible so communities where it operates can adapt the program to their needs.[152]

If, however, the implemented program gives communities complete flexibility in program design and policy development, the "replicated" program may look very different in different communities. Consequently, program design requires retaining what works in the program, while giving communities the flexibility to modify the program to meet their specific needs. Ensuring quality operation of such programs across many communities and at different levels of government is very challenging.

In addition, scale-up issues arise when design compromises occur to reduce the cost of large-scale dissemination of the intervention. Specifically, many efforts to "go to scale" fall apart because the central tenets of the demonstration program are lost in the large-scale implementation. Often, this occurs because funding for the large-scale program is not sufficient to replicate fully the demonstration program. In other cases, quality control is poor or variations on the model program occur. If compromises remove critical components of the demonstration program, the large-scale program can fail.

It is clear that certain home visiting, childcare, preschool and family literacy programs can significantly improve outcomes for families and children. Notwithstanding these successful projects, it is necessary to decide whether dropping such programs into individual communities will improve a child's lifecourse outcome. An alternative way to scale up such projects might be to consider them as components of some larger community effort that includes other elements such as community policing, economic development, and employment development projects. Such a larger community effort might coordinate services through a family resource center, or other community institution such as a library, existing community collaborative, community center, or school.

Options

- The legislature may wish to request studies of proposed large-scale programs that review "best practices" in relevant demonstration programs in order to determine the specific program components that are critical to a program's success. Such studies could include reviews of results-based monitoring processes along with monitoring the initial design of large-scale programs. Similarly, all programs should include continuous quality improvement processes so that local operations can perform self-evaluations.

- The legislature may wish to require that any new projects include evaluation or assessment components that look both at how the local implementations occur and at the results achieved by those programs. Proposed large-scale programs should include discussions of "best practices" derived from the research in order to determine the specific program components that are critical to program success. Large-scale programs should make explicit their mission, goals, and objectives, as well as measurable outcomes for which they expect to be held accountable. Local programs should incorporate an internal continuous quality improvement process, perform self-evaluations, and ensure that experience gained from program operation improves the responsiveness and effectiveness of their services.

- The legislature may wish to establish large-scale pilot projects that would build on the knowledge learned from projects such as AB 1741, Healthy Start, and other school- or community-linked collaboratives. Such pilots should focus on identifying the issues associated with scaling-up the essential elements of the successful early childhood intervention demonstrations. Pilots should clearly enunciate results-based goals and objectives, and should include funded evaluations designed to develop knowledge about implementation, project operation, goal attainment, and analysis of what does and does not work.

Is it Possible to Finance a Comprehensive Set of Early Childhood Interventions?

Early childhood programs cost money. Individuals currently spend significant amounts to provide childcare and preschool for their children. In addition, the federal, state, and local governments provide significant funding for a variety of programs. Private spending on such services very likely exceeds public expenditures for such services. Notwithstanding these expenditures, many observers assert that governments at all levels must increase funding on early childhood services both to increase the quality of service and to increase the supply of services.

Identifying financing strategies is difficult, however, because the extent of need is not well defined. The complex set of public and private funding streams for such services makes rational discussion of a financing plan virtually impossible. Discussions must unravel the existing funding streams and reconstitute them in such a way as to support a more coherent system of service strategies. To that end, policymakers must assure constituency groups that any new system of services will consider their needs.

Financing strategies for new services are difficult to discuss due to clear signals from the electorate that new tax proposals must be well-defined and crafted to solve specific needs. While cost-benefit studies suggest some service strategies may provide a significant return on investment, efforts to redirect funds from other activities are dependent on a more complete understanding of benefits and costs of such interventions. As discussed earlier, however, such studies are for small populations, and large-scale programs may not provide benefit-cost ratios of the magnitude found in those small-scale studies. In addition, while the benefits may be real, it could be difficult to capture those benefits when financing schemes rely on redirected funds from other programs, or that are based on cost savings in the private sector. Consequently, identifying a viable investment strategy is difficult.

Options

- The legislature may wish to direct state agencies to identify alternative investment strategies for early childhood initiatives. Since many analysts consider expenditures on prevention and early intervention as investments, state agencies could consider ways to incorporate in their analyses calculations of cost savings or reduced future expenditures. In addition, such analyses could include private investments as part of an investment strategy.

- The legislature may wish to consider ways to remove impediments, or to provide incentives to the private sector, for investments in early childhood programs. For example, health care providers may wish to support community-based home visiting programs in order to reduce future health care expenditures, but may have regulatory, taxation, or other barriers to such strategies. Such impediments may be particularly significant for Medi-Cal, Indigent Health, or California Children's Health Plan subsidized by federal, state, or local revenues. Businesses may want to provide additional support for childcare or preschool services in their communities in order to improve employee morale or assure a future supply of labor. A full analysis of ways to allow private investors to recapture a portion of any savings from such investments might provide large social benefits.

- The legislature may wish to consider appointing a task force, or directing the Child Development Programs Advisory Committee, to develop strategies for determining nontraditional ways in which local communities could develop services desired by their residents.

Do We Understand the Importance of Transitions to School and Between Levels of School?

The studies discussed in the previous sections strongly suggest that effective prevention and early intervention programs can improve children's readiness for kindergarten. Some interventions also can significantly influence long-run lifecourse outcomes. Studies suggest it is possible to improve a child's lifecourse outcomes; however, treatment group children in those studies typically continue to perform below the level of non at-risk

children.[153] Some studies also show only transient gains in cognitive ability or academic achievement for children in the programs.

Some researchers suggest that current practices in many kindergarten classrooms are inconsistent with or incapable of coping with large numbers of at-risk children.[154] Consequently, gains made by at-risk children in early childhood programs may be lost following entry to kindergarten. Sustaining the gains made during early childhood interventions may require reexamination of transitions between such programs and kindergarten, as well as to other grade levels.[155] Elk Grove Unified School District, for example, works with preschool providers and kindergarten teachers to develop ways to smooth the transition between preschool and kindergarten. Such efforts could be encouraged statewide.

Options

- The legislature may wish to establish a task force or contract for studies to determine ways to smooth the transition from preschool to kindergarten. Further, such studies could examine ways in which K–12 schools can sustain gains from early childhood programs. Specifically, they might explore whether changes in curriculum, school site organization, family support efforts, or site management would carry forward gains made by children in early childhood interventions.

- The legislature may wish to direct the Commission on Teacher Credentialing to review training programs for teachers in order to determine whether teacher training programs include training on articulation between levels of schooling or quality improvement. Administrator training programs should undergo a similar review.

SUMMARY

Children living in a stressful environment, or in a family with little parent-child interaction, are more likely to experience difficulty in school as they mature, either because of retarded cognitive development or because of behavior problems induced by that stressful environment. Recent findings from the brain development research provide support for such observations. This research shows that a lack of proper cognitive stimulation during the first three years affects language acquisition and vocabulary. This research also identifies how environmental stress can cause abnormal levels of hormones and neurotransmitters which affect behavioral development.

High quality experimental programs suggest how effective interventions early in a child's life can help compensate for a lack of cognitive stimulation by parents, and for multiple environmental stresses in the home or neighborhood. While these findings provide hope for children who are at-risk for cognitive delay, it is also clear that there is much that remains unknown about these interventions. The literature makes clear that it is possible to provide effective preventive or early interventions to help offset the rigors of stressful environments. It is also clear that scientists studying these projects believe that they are unlikely to offset completely the effects of bad environments.

In order to ensure the best chance of success for at-risk children, other interventions, both in the most impacted neighborhoods and at other stages in the child's life, may be necessary. Nevertheless, benefit-cost analyses of some early childhood intervention projects and general understanding of the cost to society of bad outcomes suggest that prevention and early intervention programs can be worthwhile investments.

APPENDIX A: TRENDS IN CHILD INDICATORS

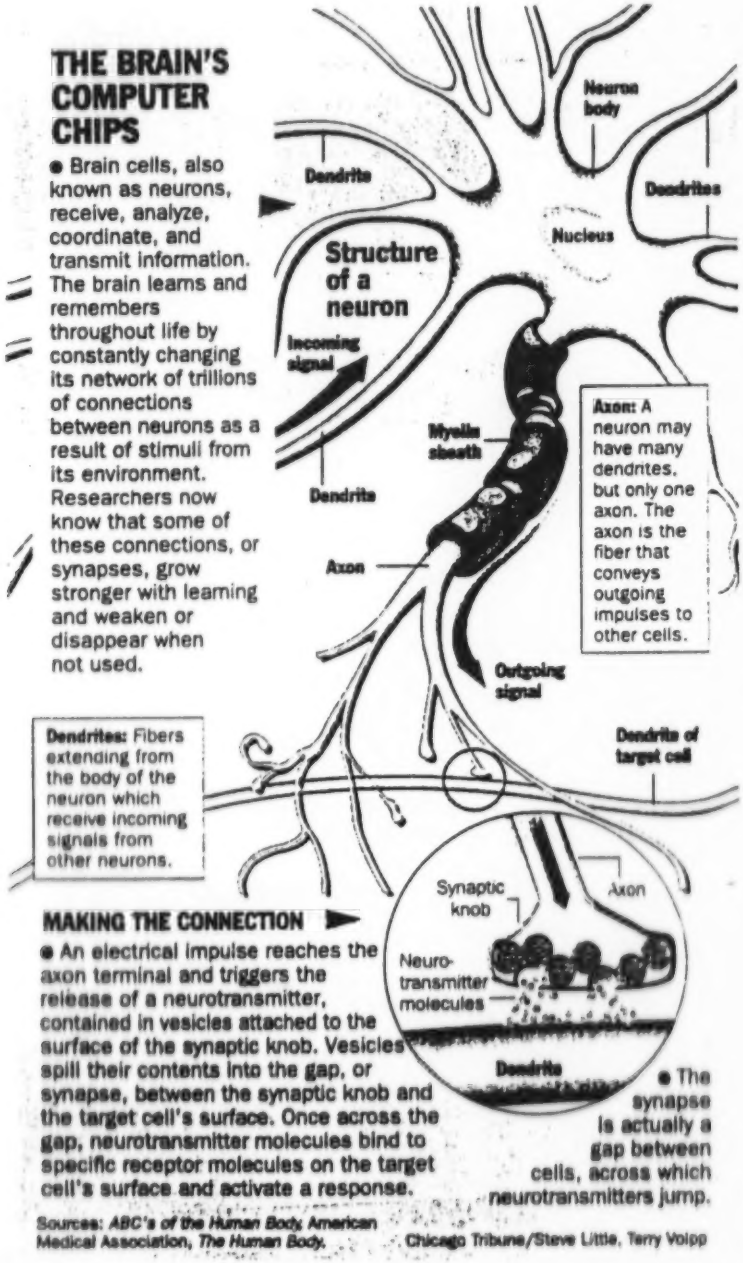
Long term trends in family composition and in the resources available to children suggest child well being may be declining. Table 1 provides trend information about several important indicators of family circumstance. Indicators of family composition, such as the proportion of all families with only one adult, with children born out of wedlock, and with two working parents, has increased since 1960. While the child poverty rate remains below its level in 1960, the poverty rate has been steadily rising, and in California, is almost back to the 1960 national level.

Table 1: Status of Children for Selected Years, Children Under Age 18 Unless Specified

Variable	1960	1970	1980	1988	1990	1996
Suicide Rate, 15 to 19 (rate per 100,000)	3.6	5.9	8.5	11.3		
Homicide Rate, 15 to 19 (rate per 100,000)	4.0	8.1	10.6	11.7		
Children in Poverty, US (percent)	26.9	14.9	17.9	19.0	19.9	20.5
Children in Poverty, California (percent)			16.7	21.7	22.3	26.0
Children Whose Parents Divorced During the Year (percent)	0.72	1.25	1.73	1.64	1.68	
Births to Unwed Mothers, US (percent)	5.3	10.7	18.4	25.7	28.0	30 (1992)
Births to Unwed Mothers, California (percent)		13	21		31	32 (1995)
Children in Households with Only One Adult (percent)	5.5	9.2	12.1	14.2		
Married Women in the Labor Force with Children Under Age 6 (percent)	18.6	30.3	45.1	57.1	58.9	61.7 (1994)

Sources: Fuchs and Relkis, 1992; US Census Bureau Statistical Abstract of the United States, (U.S. Government Printing Office, Washington DC), 1995, and US Census Bureau, "Poverty in the United States: 1996," P60-198, US Department of Commerce,(September 1997) .
California child poverty data are from California Department of Finance, Demographics Unit.
California Births to Unwed Mothers from California Department of Health Services, Vital Statistics 1990 and 1996.
All data except where noted are national.

APPENDIX B: BASIC STRUCTURE OF THE BRAIN AT THE CELLULAR LEVEL


THE BRAIN'S COMPUTER CHIPS
• Brain cells, also known as neurons, receive, analyze, coordinate, and transmit information. The brain learns and remembers throughout life by constantly changing its network of trillions of connections between neurons as a result of stimuli from its environment. Researchers now know that some of these connections, or synapses, grow stronger with learning and weaken or disappear when not used.
14
How the Brain Gets Built
Structure of a neuron
Neuron body
Dendrite
Dendrites
Nucleus
Incoming signal
Myelin sheath
Dendrite
Axon
Axon: A neuron may have many dendrites, but only one axon. The axon is the fiber that conveys outgoing impulses to other cells.
Outgoing signal
Dendrites: Fibers extending from the body of the neuron which receive incoming signals from other neurons.
Dendrite of target cell
Synaptic knob
Axon
Neuro-transmitter molecules
Dendrite
MAKING THE CONNECTION
• An electrical impulse reaches the axon terminal and triggers the release of a neurotransmitter, contained in vesicles attached to the surface of the synaptic knob. Vesicles spill their contents into the gap, or synapse, between the synaptic knob and the target cell's surface. Once across the gap, neurotransmitter molecules bind to specific receptor molecules on the target cell's surface and activate a response.
• The synapse is actually a gap between cells, across which neurotransmitters jump.
Sources: ABC's of the Human Body, American Medical Association, The Human Body.
Chicago Tribune/Steve Little, Terry Volpp

Source: Ronald Kotulak, Inside the Brain: Revolutionary Discoveries of How the Mind Works (Andrews McMeel, Kansas City) 1997, page 14.

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APPENDIX C: EXPERIMENTAL RESEARCH ON COGNITIVE DEVELOPMENT

The developmental psychology literature contains four high-quality experiments designed to determine whether early, intensive cognitive stimulation interventions can affect children's cognitive ability over the long-run (i.e., at least through completion of school). Table 2 summarizes the cognitive results for these projects.

Brief summaries of the study findings follow:

- **The Milwaukee Project.** The Milwaukee Project was a test of whether an intensive educational childcare program could affect the cognitive development of children born to parents with subnormal IQ's – IQ scores under 75.[156] Researchers assigned children either to a program of year-around 40-hour per week childcare beginning at about six weeks of age and continuing until entry into first grade, or to a control group. The childcare children received a curriculum designed to provide intellectual stimulation intended to compensate for assumed lack of stimulation in the home. Parents of children in the treatment group also received employment training and other social services. In addition to the results shown in Table 2, retention in grade and referral to special education were lower for the experimental children.[157]

- **The Abecedarian Project.** The Carolina Abecedarian Project was a test of whether an intensive educational childcare program could affect the development of children at-risk of developmental delay. Researchers used a risk assessment tool designed to provide a measure of family depravation for selecting families into the experiment[158]. Like the Milwaukee Project, this experiment assigned children either to intensive educational childcare (from about six weeks of age to kindergarten entry) or to a control group.[159] At 15 years of age, children in the experimental group were a little more than half as likely to have repeated a grade and about half as likely to have had special education referrals.[160] Finally, at age 15, experimental children reported significantly higher achievement test scores when compared to the control children.[161]

Table 2: Difference in IQ[162] scores between experimental and control children (a) – Selected Ages

	Age				
	3 years	**5 years**	**8 years**	**12 years**	**15 years**
Milwaukee Project	24 (b)	22 (b)	20	10 (c)	
Abecedarian Project					
Full Sample	17	10	6 (f)	7 (f)	7 (d)
Low Parental IQ Subgroup		22 (e)			12 (f)
Project CARE	12	12 (g)			
IHDP					
Full Sample (all babies under 2500 grams)	9	0	0		
2001 – 2499 grams at birth	13	4 – 6 (h)	4 – 6 (h)		

a) Educational childcare versus no educational childcare. This difference, rather than absolute IQ scores, is an appropriate focus since the effect of the intervention is our interest.
b) Adjusted score differences to account for so-called "training effect." The unadjusted scores at 3 years are about 30 points and at five years about 26 points (Garber et al, 1991).
c) Almost significant at the 5% level using Garber's test. Using a t-score the difference is significant at the 5% level (Seitz, 1990).
d) Significant at the 8% level.
e) Martin, Ramey, and Ramey, 1990.
f) Campbell and Ramey, 1995.
g) The difference shown here is for the treatment group compared to the control children who did not use more than 12 months of community day care (Wasik, et al, 1990).
h) McCarton, et al, 1997.

- **Project CARE.** Project CARE is a replication of the Abecedarian Project. Project CARE included three groups – two experimental groups and one control group. One experimental group received an intensive educational childcare program. The other experimental group received home visits beginning at about three months following the birth of their child.[163] Only the intensive childcare group reported significant improvement relative to the control group.[164]

- **Infant Health and Development Program (IHDP).** The IHDP is an eight-site 985 family replication of the Carolina Abecedarian Project and Project CARE models.[165] It differs from the Abecedarian and Project CARE trials in that the IHDP targeted families with low-birth-weight (LBW) babies. Because these children had shorter gestation periods than full term babies, researchers felt that the intervention group

children should not enter educational childcare until they reached one year of age. Further, the IHDP intervention ended at age three. Consequently, treatment children received a less extensive intervention than either the Abecedarian or CARE projects. Experimental children, who were between 2000 and 2500 grams – the heaviest of the LBW babies in the experiment – at birth, were the only group to show significant improvement through eight years of age.[166]

These studies provide support for the idea that cognitive decline common in at-risk children can be offset and can be sustained through adolescence.[167] This is particularly true when considering broader outcome measures such as achievement test scores, retention in grade and referrals to special education.

Finally, such experiments show that it is possible to prevent cognitive delay. Many issues, however, require additional study. Among those issues are (1) whether such projects can be scaled up; (2) what features are critical to their success; and (3) the benefits and costs of such interventions.

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ENDNOTES

[1] Newsweek, 1997.

[2] Larner, Terman, and Behrman, 1997 for a discussion of the potential effects of welfare reform on children.

[3] Hernandez and Myers, 1993.

[4] Cognitive development means the development of such mental processes as thinking, memory, language, problem solving, creativity, and perception. Delay in cognitive development means that a child (or adult) develops such processes at a rate that is slower than the average rate of development based on surveys of children (or adults) in the general population.

[5] "Family risk factors" refers to family or neighborhood circumstances such as poverty, neighborhood violence, low educational attainment, substance abuse, mental illness, or social isolation associated with an increased likelihood (compared to the general population) that children will experience "poor" outcomes. Poor outcomes refer to a variety of negative life events such as increased incidence of teen pregnancy, increased incidence of juvenile crime, or reduced incidence of school completion.

[6] In this context, association means that a statistically significant correlation exists between variables used in the study discussed. Association does not mean that the study establishes causation between one variable and another. For example, a study may find that parental substance abuse is related to increased likelihood that a child will experience some behavior problem in school. Such a finding does not mean that the parental substance abuse causes the poor behavioral outcome. In this case, however, such a conclusion is a plausible theory of a cause of the poor outcome.

[7] As used here, cognitive delay means that a child is developing at a rate which is below that for the general population of children of the same age. Such determinations use a variety of developmental indexes and so-called IQ and achievement tests to measure various abilities and make comparisons to samples of the general population. Such abilities include basic life or academic skill knowledge, and measures of reasoning ability.

[8] Undesirable means that a child exhibits one or more lifecourse outcomes that policy makers and society are attempting to discourage. For example, poor outcomes include teen pregnancy, teen substance abuse, interaction with the juvenile justice system, or school dropout.

[9] See, for example, Duncan and Brooks-Gunn, 1997.

[10] As used in this discussion, poverty generally means family income below federal poverty guideline for the relevant family size. Occasionally, however, other measures such as "relatively low income" are used to make comparisons among families in the research study.

[11] White, 1982; Brooks-Gunn, Klebanov, and Duncan, 1996; Duncan, Brooks-Gunn, and Klebanov, 1994; and Huston, McLoyd, and Garcia-Coll, 1994.

[12] Korenman, Miller, and Sjaastad, 1994.

[13] See, for example, Hashima and Amato, 1994.

[14] Leadbeater and Bishop, 1994.

[15] Haveman, Wolfe, and Spaulding, 1991.

[16] Montgomery, Kiely, and Pappas, 1996; and Kington and Smith, 1997. Wu, 1996 discusses the effects of family and income instability on the likelihood of premarital births.

[17] Duncan and Brooks-Gunn, 1997.

[18] See the next section, "The Influence of Risk and Protective Factors on Children's Outcomes," for a discussion of those studies.

[19] Educational Attainment generally refers to the highest level of school or number of years of school completed.

[20] Haveman and Wolfe, 1995; and Duncan, Brooks-Gunn, and Klebanov, 1994

[21] In the context of this study, which took place in Canada, placement in a special class indicates severe school maladjustment. Pagani, Boulerice, and Tremblay, 1997.

[22] Duncan and Brooks-Gunn, 1997.

[23] McLanahan and Sandefur, 1994. These authors find that underlying factors such as low income, parenting practices (including supervision, aspiration, and involvement), and family disruption during high school years explain much of the difference between single-parent and two-parent families. Other factors affecting these results include family conflict and reduced community resources (due, in part, to residential location choices forced by reduced income and, in part, to residential mobility and its associated disruptions in relationships).

[24] Lipman and Offord, 1997; and Pagani, Boulerice, and Tremblay, 1997.

[25] Lipman and Offord, 1997.

[26] Yoshikawa, 1994; and Sampson and Laub, 1994.

[27] Dornbusch, et al, 1987; Sampson and Laub, 1994; Steinberg, et al, 1992; and Glasgow, et al, 1997.

[28] Punitive or harsh parenting styles characterize parenting styles that include the use of spanking, demands of obedience, and use of directives with little give-and-take with children. Such findings may conflict with cultural variations in acceptable parenting styles. An indulgent parenting style involves loving, kind but permissive behaviors by parents. A negligent parenting style essentially is what it seems, the parents effectively ignore the child and allow she/he to do whatever he/she pleases with little guidance. For example, see the discussion of such differences in Okagaki and Sternberg 1993. See Conger, et al , 1994 for a discussion of coercive family practices.

[29] Farrington, 1994.

[30] Hashima and Amato, 1994.

[31] Bradley and Caldwell, 1976; and Bradley, et al, 1989.

[32] Dodge, Pettit, and Bates, 1994.

[33] Coates and Lewis, 1984; Steinberg, Lamborn, Dornbusch, and Darling, 1992; and Sampson and Laub, 1994.

[34] Brown, 1992.

[35] Dana Alliance for Brain Initiatives, 1995.

[36] See, for example, Pollitt, 1994, and Grantham-McGregor, Schonfield, and Powell, 1987.

[37] Kleinman, et al, 1998.

[38] Infant Health and Development Program 1990.

[39] Lipman and Offord, 1997.

[40] Chomitz, Cheung, and Lieberman, 1995.

[41] Fitzgerald, et al, 1993.

[42] Carnegie Task Force on Meeting the Needs of Young Children, 1994.

[43] Needell, 1995; and Zukerman, 1991.

[44] Needell points out the poor quality of much of the research identifying these outcomes and cautions that confounding variables such as poverty status, malnutrition, and other factors many affect these outcomes. Thus, the precise mechanism by which certain substance use or abuse causes the documented bad outcomes remains unclear. Examination of the literature on brain development suggests that scientists are closing in on some of those mechanisms. See also Kronstadt, 1991.

[45] Rivera, et al, 1997.

[46] Rivera, et al, 1997.

[47] Fitzgerald, et al, 1993.

[48] Zukerman, 1991; and Kronstadt, 1991.

[49] Taylor, et al, 1994.

[50] Taylor, et al, 1994.

[51] Osofsky, 1995.

[52] Osofsky, 1995. The discussion of brain development research presents more research on the chemical basis for PTSD.

[53] Osofsky, 1995.

[54] O'Campo, et al, 1997.

[55] Gorman and Pollitt, 1996; Sameroff, Seifer, Baldwin, and Baldwin, 1993; and Liaw and Brooks-Gunn, 1994.

[56] Werner and Smith, 1982; Werner, 1989; Bernard, 1991; Garmezy, 1992.

[57] Werner, 1989; and Bernard, 1991.

[58] Bernard, 1991.

[59] This section relies on several recent sources for useful summaries of the technical literature. Two works, Inside the Brain by science writer Ronald Kotulak and "Rethinking the Brain" by Rina Shore, provide particularly clear descriptions of these findings. Other reports by organizations such as the Education Commission of the States (1996), Carnegie Task Force on Meeting the Needs of Children, 1994, and annual reports from the Dana Alliance for Brain Initiatives (1995, 1996, and 1997) support these works.

[60] Shore, 1997.

[61] Kotulak, 1997, cites the work of William Greenough and others at the University of Illinois.

[62] Kotulak, 1997 discusses findings from a number of researchers supporting such conclusions.

[63] Among the more important of these chemicals are serotonin and noradrenaline (which are neurotransmitters – chemicals that are critical for forming and sustaining brain connections and allowing the retrieval of memories). In addition, prolonged elevated levels of glucocorticoids – which include adrenaline – in the brain can cause the brain to contract in size as brain connections wither; Sapolsky, 1996.

[64] Kotaluk, 1997, cites work of Burr Eichelman at Temple University.

[65] Shore, 1997; and Kotulak, 1997.

[66] For example, if a cat looses the use of one eye from birth by covering it, its brain will quickly co-opt the synapses reserved for the nonfunctioning eye. Uncovering the eye later leaves the eye useless because the cat's brain is no longer in a position to use information it captures from the now functioning eye. Kotulak, 1997 cites the work of Torsten Wiesel and David Hubel on the importance of sensory experience and on critical periods for learning. This work led to a Nobel Prize for the researchers.

[67] Kotulak, 1997, discussing the work of William Greenough.

[68] This term is pervasive in the popular literature on brain development. The Carnegie Commission Task Force on Meeting the Needs of Young Children, (1994) report uses it, but the term may predate that report.

[69] Kotulak, 1997, citing the work of Jenny Saffran and others at the University of Rochester.

[70] Shore, 1997; and Kotulak, 1997 citing the work of Janellen Huttenlocher of the University of Chicago. Also see Jusczyk and Hohne, 1997.

[71] Kotulak, 1997, citing the work of Hart and Risley, 1995. See also Walker, et al, 1994

[72] Garber, 1988; Ramey and Ramey, 1997; and McCarton, et al, 1997.

[73] Kotulak, 1997, citing the work of Martha Pierson of Baylor University and the work of Robert Sapolsky of Stanford. These researchers study the effects of stress on animals such as rats and baboons.

[74] Kotulak, 1997, citing the work of Martha Pierson of Baylor University on the death of young rats. See also Sapolsky, 1996.

[75] Kotulak, 1997, citing the work of others.

[76] Perry, 1997; and Sapolsky, 1996.

[77] Kotulak, 1997; cites the work of scientists using imaging technologies such as PET scanners to study adults who suffered post-traumatic stress syndrome due to childhood sexual abuse. In addition, Kotulak cites the work of Geraldine Dawson of the University of Washington who studies the infant children of depressed mothers.

[78] See, for example, Jensen, 1969; Herrnstein and Murray, 1994; Goldberger and Manski, 1995; and Gould, 1996 for perspectives from each side. At each extreme of this debate are researchers who argue that either genetics or environment accounts for almost all of the variance in cognitive ability among individuals as measured by IQ tests. Neither Jensen nor Gould takes such an extreme view.

[79] Other issues include the analysis and interpretation of data, the design of experiments to test hypotheses, and whether physical size of the brain or other parts of the human anatomy are useful as determinates of cognitive function.

[80] Even Herrnstein and Murray, and Jensen suggest that environment plays a limited role in brain development.

[81] Neisser, et al, 1996 summarizes the areas of agreement and disagreement based on available research.

[82] Shore, 1997 describes this dynamic process as a "dance" between genes and environment.

[83] The CHDP program receives funding from Medi-Cal and other state and local sources. It provides health care to children whose families meet income eligibility requirements.

[84] Hill, 1992 discusses benefit-cost evaluations of the WIC program as well as cost effectiveness of immunization and preventive health care programs such as EPSDT. See also Devaney, Billheimer, and Schore, 1992; and General Accounting Office, 1992.

[85] At least one author feels that preschool programs only really address social competency issues, Reynolds, et al, 1997.

[86] Gullo and Burton, 1992; and De Cos, 1997.

[87] General Accounting Office, 1997. This study emphasizes the need to perform clinical trials and large randomized experimental designs rather than the current emphasis on quasi-experimental evaluations. Federal and state agencies, however, seldom fund such high-quality evaluations.

[88] Schweinhart, et al, 1993, and Gray, et al, 1982. Lazar and Darlington, 1982; and Royce, et al, 1983 summarize findings from a variety of longitudinal studies including the Perry Preschool and Early Training Projects.

[89] Schweinhart, et al, 1993; and Gray, et al, 1982; and, Lazar and Darlington, 1982.

[90] Royce, et al, 1983; and Schweinhart, et al, 1993.

[91] Schweinhart, et al, 1993; and Gray, et al, 1982; Lazar and Darlington, 1982; and Barnett, 1992.

[92] McKay, et al, 1985; and Haskins, 1989. More recent evaluations using more sophisticated statistical techniques include Curry and Thomas, 1995, and Reynolds and Temple, 1996.

[93] McKay, et al, 1985.

[94] Reynolds and Temple, 1996; and Reynolds, et al, 1996.

[95] Haskins, 1989.

[96] McKay, 1985.

[97] Lee, et al, 1988 and 1990. These studies find that because waiting lists for entry typically exist at Head Start sites, program operators often choose the least advantaged children for participation. Consequently, program participants are the least advantaged of the children on waiting lists. See, also, General Accounting Office, 1997.

[98] One reviewer suggests that such concern is not surprising given that such programs have very small evaluation and quality improvement budgets, Reynolds, et al, 1997.

[99] As used here, at-risk infants and toddlers mean children whose parent(s) exhibit mental retardation (usually defined as having IQ scores below 75 on most tests). In addition, at risk means children who are at risk for child maltreatment because their parents have one or more risk factors such as, being a teen parent, experiencing a mental condition, or using drugs or alcohol. Finally, at risk means a child who is a low birth weight baby.

[100] Garber and Hodge, 1989; Ramey, Yeates, and Short, 1984; and Burchinal, et al, 1997.

[101] IQ scores are used as measures of cognitive development and are only used to make comparisons at the mean between groups.

[102] Garber, et al, 1991, and Martin, Ramey, and Ramey, 1990.

[103] This conclusion is based on the scores on IQ tests discussed in Appendix C.

[104] Garber, 1988, and Campbell and Ramey, 1995.

[105] Campbell and Ramey, 1995.

[106] Lally, et al, 1987; and Pierson, 1988.

[107] Bronson, Pierson, and Tivnan 1984.

[108] Lally, et al, 1987; and Pierson, 1988.

[109] Pierson, 1988; and Lally, et al, 1987.

[110] Lally, et al, 1987.

[111] It is important to recognize, however, that these researchers do not claim that the children receiving intensive early childhood interventions are, as a group, performing like a cross section of the school age population. To test this, researchers directing one project – the Carolina Abecedarian project – drew a random sample of the general school population to compare against their treatment children, Campbell and Ramey, 1995. They found that the treatment children remained more likely to repeat a grade, more likely to use special education services and scored lower on achievement tests than the general school sample. Nevertheless, the treatment children did significantly better than the control children – much better performance, for example, on reading and math achievement tests at both 12 and 15 years of age.

[112] Grantham-McGregor, et al, 1987 and Grantham-McGregor, et al, 1994

[113] Powell and Grantham-McGregor, 1989.

[114] Olds, et al, 1986 Olds, et al, 1988, Olds and Kitzman, 1993, Kitzman, et al, 1997, Seitz, Rosenbaum, and Apfel, 1985, and Gutelius, et al, 1977.

[115] This study defines "at-risk families" as those families who are single parents and are low SES families at program entry.

[116] Olds, et al, 1997.

[117] The Houston Parent-Child Development Center demonstration project is one such project (Johnson, 1988). The treatment group (chosen by random assignment) received home visits (focused on parent-child interaction) during the infant's first year in the program (age one). The project supplemented home visits with family workshops on weekends so fathers could attend. In the child's second year in the program (age two), children attended a developmental childcare center four days per week while their mothers attended classes on topics such as household finance and parenting. Other examples include the Washington DC Cognitive Stimulation Program that combined a two part home visiting program – health screenings and family support – for unmarried schoolgirls in Washington, D.C. (Gutelius, et al, 1977).

This project also provided group sessions for some participants. A final example is the Yale Family Support Intervention project that recruited low SES families at childbirth (Seitz, Rosenbaum, and Apfel 1985). The intervention included regular well baby and developmental screenings, family support home visits, and access to high-quality day care.

[118] Johnson, 1988; and Seitz, Rosenbaum, and Apfel, 1985.

[119] Seitz, Rosenbaum, and Apfel, 1985.

[120] Johnson, 1988; and Gutelius, et al, 1977.

[121] Johnson and Walker, 1991.

[122] Gutelius, et al, 1977.

[123] Gutelius, et al, 1977.

[124] Seitz, Rosenbaum, and Apfel, 1985.

[125] General Accounting Office, 1990 assesses the literature and finds that such programs have merit.

[126] Olds and Kitzman, 1993; and Powell, 1993.

[127] High quality in such studies generally defines a set of inputs to the child care setting that include low caregiver-child ratios (1:3 for infants, up to 1:8 for three- to five-year-olds), use of caregivers with training in child development/early child education, sanitary and safe childcare areas, and child-centered curricula. See, for example, PACE, April 1995, and Phillips, 1995.

[128] Caughy, DiPietro, and Strobino, 1994. Measurement of home environment uses an assessment tool called the HOME scale. This assessment tool rates family functioning along a number of dimensions found to be related to the provision of a cognitively stimulating and emotionally supportive home environment.

[129] Andersson, 1992.

[130] Howes, Phillips, and Whitebrook, 1992; PACE, April and October 1995; NICHD, 1997; and Burchinal, Lee, and Ramey, 1989.

[131] Discussions of family resource centers and school- or community-based collaboratives can be found in Illig, 1995, and DeLapp, 1993 and 1997.

[132] McDonald, Barbara, "California Public Libraries Providing Family literacy Since 1988: A Program Evaluation," Draft Final Report, 1997.

[133] See, for example, Sherman, 1994.

[134] Barnett, 1985; and Barnett, 1993.

[135] Olds, et al, February 1993. The authors used data collected during the two years of the intervention and for two years of follow-up.

[136] Seitz, Rosenbaum, and Apfel, 1985.

[137] See Barnett and Escobar (1987) for a summary of findings.

[138] Barnett, 1992 and Olds, et al, 1997 discusses benefit-cost analyses of his home visiting project.

[139] Chamberlin, 1989; Kagan, 1994, Kagen and Cohen, 1997, and Weiss, 1993.

[140] Illig (1995) discusses issues related to collaborative and integrated services strategies that might include such broader community services. Illig, 1994; and DeLapp (1997) discusses the use of such collaboratives as part of welfare reform strategies.

[141] Estimates by the General Accounting Office, 1993, indicate that only about 33 percent of three- and four- year-old children who live in families with incomes below the federal poverty line are in preschool programs.

[142] Governor's Office of Child Development and Education, 1998.

[143] Child Development Division, 1996-97.

[144] Department of Finance, 1998.

[145] $175 million is for four-year-olds, Total spending for three- and four-year-olds would be about $220 million.

[146] There is no consistent information on the entire range of programs; therefore, estimates are largely speculative. In addition, many projects are pilots; thus, they do not have funding to provide services to all eligible families. Examples of programs that regularly report an inability to serve all eligible children are the Head Start and State Preschool programs.

[147] Among the better known critics are Fagan, 1996; Herrnstein and Murray, 1994; Olasky, 1992; and Murray, 1984. Others accept the need for interventions but challenge the need for higher levels of government, such as the federal government, to design "one size fits all" interventions. See Wilson, 1997 for one version of this argument.

[148] Success for All and Beacon Schools are school-wide reform efforts that include family support components and links to community-based family, youth, and child programs. In that regard, these school site "systemic reform" efforts have some of the attributes of Healthy Start projects.

[149] Kagan and Cohen, 1997

[150] The Systems of Care program provides eligible counties with increased flexibility in the use of certain funds used to provide services to children with certain mental illnesses in order to reduce overall costs of service.

[151] Reynolds, et al, 1997 discusses some of these going-to-scale issues.

[152] See, for example, Schorr, 1997.

[153] Campbell and Ramey, 1995, and Schweinhart,et al, 1993.

[154] California Department of Education, 1997.

[155] Entwisle, 1995. A recent study by Reynolds and Temple (1996) points to the benefits of coordinated programs that extend from preschool into elementary school years. Finally Woodhead, 1988; and Zigler and Seitz, 1993, discuss the need to focus on both transitions and on educational processes during elementary and secondary school.

[156] Garber, 1988; and Garber, et al, 1991. This experiment had a very small sample size – approximately 17 experimental and 18 control children. This experiment has been criticized because of questions about the random assignment process, ambiguity in the number of children tested, veracity of the lead investigator (Richard Heber), and "teaching to the test" (Spitz 1991 and Locurto 1991).

[157] Garber, et al, 1991.

[158] Ramey, Yeates, and Short, 1984.

[159] The Abecedarian Project included 104 children divided into two treatment groups of 52 children each. The children entered the program in four waves because of space limitations in the day care center.

[160] Campbell and Ramey, 1995. About 31 percent of the experimental group had grade retentions while about 54 percent of the controls were retained in grade. Similarly, about 24 percent of the experimental group and 48 percent of the controls had special education referrals.

[161] Campbell and Ramey, 1995.

[162] IQ scores are measures of certain abilities and skills thought to correlate highly with cognitive ability. Individual scores are comparisons to the scores of a sample of the general population (called a "norming" group). Thus, an individual IQ score represents a performance that is to the performance of the norming group in his/her age class. Further, IQ scores are standardized so that the average performance produces a score of 100.

[163] Wasik, Ramey, Bryant, and Sparling, 1990.

[164] Wasik. et al (1990) report that many of the children in the control group attended center-based childcare for more than 12 months by the time they entered kindergarten. The researchers compared the two control groups and found an approximately seven percentage point difference in IQ scores favoring the controls with community childcare at kindergarten entry.

[165] Infant Health and Development Program, 1990.

[166] McCarton, et al, 1997.

[167] The Syracuse University Family Development Research Program also tested an intervention that included day care for children between six months and five years of age (Lally, Mangione, and Honig 1987). The researchers also included a family-support home-visiting program. The FDRP found that early cognitive gains by the treatment children had dissipated by 72 months of age. It is not clear that this program had as a goal reduction of cognitive deficits among at risk children. At the ten year follow up, the main findings were that program children were significantly less likely to be caught up in the juvenile justice system. The program children also were more likely to report positive perceptions about themselves and their future. This study suffers from the lack of a randomly assigned control group. The researchers chose a comparison group three years after the program began.